Draft Resource Action Development for Geographic Area Discussion: The low flow channel from the Fish Barrier Dam to the Afterbay Outfall
Oroville Facilities Relicensing
February 19th, 2003 12:30-3:00 PM

Introduction

In order to develop an appropriate settlement alternative, potential protection, mitigation, and enhancement (PM&E) measures need to be identified. PM&E measures associated with Oroville Facilities are expected to undergo evaluation associated with NEPA/CEQA in Summer 2003. The intent of this exercise was to integrate key results and findings to date for the low flow reach of the Feather River to provide a cohesive environmental picture of the geographic area. At this point in time, much of the important data is still unavailable. Available key results were compiled to provide a starting point from which the Workgroup could begin discussing PM&E measures in the low flow reach of the Feather River between the Fish Barrier Dam and Afterbay Outfall.

The potential resource impacts presented in this packet are based on the draft impact statements developed for the Preliminary Draft Environmental Assessment (PDEA). These draft impact statements were compared with the CEQA checklist and contain all relevant issues identified during the scoping process. In addition, the impact statements used for this exercise were made more specific to the reach of interest from discussions with technical resource experts, key results/information to date, and a review of the study plans.

In this exercise, we focused only on the Feather River between the Fish Barrier Dam to the Afterbay Outfall. It is anticipated that other potential impacts will come to light or that potential impacts listed here will be clarified or modified in future documents as more information becomes available. Time constraints limited this information review to four primary resource areas: fisheries/aquatics, water quality, terrestrial, and geomorphology.

Explanation of Notation in Potential Impact Statements

- The draft Resource Action Measures listed in the potential impact statements are derived from Appendix B, Resource Issues, Concerns, and Comments Tracking (Final NEPA Scoping Document 1 and CEQA Notice of Preparation (September 17, 2000). The issues, concerns, and comments were identified by Participants through the Alternative Licensing Process. Some of these issues were identified during pre-scoping activities conducted between June and November 2000. Others were developed by the Plenary Group and Work Groups during more recent meetings or included in comment letters submitted by several of the Participants. Resource Action Measures were listed by issue area in each of the potential impact statements; the following notation is used throughout this document:

  FE--Fisheries
  W--Water Quality
  TE--Terrestrial

- Resource Goals listed in this document are taken from goals described by the Environmental Workgroup (1/21/2003)

Table 1. List of study plans for Oroville Facilities Relicensing that are collecting data from the low flow section of the Feather River (Fish Barrier Dam downstream to Afterbay Outfall).

		Resource Area			
Study Plan ID	**Title**	**Fisheries/Aquatics**	**Water Quality**	**Terrestrial**	**Geomorphology**
SP-F1	Evaluation of Project effects on non-fish aquatic resources	X			
SP-F2	Evaluation of Project Effects on Fish Diseases	X			
SP-3.2	Evaluation of Project Effects on non-salmonid fish in the Feather River Downstream of the Thermalito Diversion Dam	X			
SP-F8	Transfer of Energy and Nutrients by Anadromous Fish Migrations	X			
SP-F9	Evaluation of the Feather River Hatchery effects on naturally spawning salmonids	X			
SP-F10	Evaluation of project effects on salmonids and their habitat in the Feather River below the Fish Barrier Dam	X			X
SP-F16	Evaluation of project effects on instream flows and fish habitat	X			X
SP-F21	Project effects on predation of Feather River juvenile anadromous salmonids.	X			
SP-G2	Effects of Project Operations on Geomorphic Processes Downstream of Oroville Dam				X
SP-W1	Project effects on surface waters	X	X		
SP-W2	Contaminant Accumulation and Aquatic Food Chain	X			
SP-W5	Project effects on groundwater		X		
SP-T1	Effects of project features and operation on wildlife and wildlife habitat			X	
SP-T2	Project Effects on Special Status Species			X	
SP-T3/T5	Riparian resources, wetlands, and assoicated floodplains			X	
SP-T4	Biodiversity, vegetation communities, and wildlife habitat mapping			X	
SP-T7	Project effects on noxious terrestrial and aquatic plant species			X	
SP-T8	Project effects on non-native Wildlife			X	
SP-T9	Recreation and Wildlife			X	
SP-T10	Effects of Project features, operations, and maintenance on upland plant communites			X	
SP-T11	Effects of Fuel Load Management and Fire Prevention on Wildlife and Plant Communities			X	

I. Aquatic Biological Resources

Potential Impact: Would the Project interfere substantially with the movement of any native resident or migratory fish species within the low flow reach of Feather River from Fish Barrier Dam to Afterbay Outfall? (SD1, Appendix B FE14, FE57, FE58)

Resource Goals:

1. Minimize and mitigate adverse project impacts on habitat, genetic integrity, and population size of anadromous fishes
2. Increase natural production of steelhead, spring run chinook salmon, fall run chinook salmon, and other anadromous fish
3. Continued mitigation for loss of anadromous fish spawning habitat in the Feather River
4. Enhance aquatic habitats through alteration of geomorphic processes
5. Minimize and mitigate adverse project related effects on fish and aquatic resources
6. Minimize and mitigate adverse project effects on regional fisheries and habitat
7. Provide populations of anadromous fish sufficient to support desired recreational and commercial fisheries
8. Minimize and mitigate adverse project-related effects on anadromous fish passage and ecological functions
9. Provide populations of anadromous fish sufficient to support desired fisheries and ecological functions
10. Provide for upstream passage of anadromous fish

Key Results/Information:

- No consistent temporal pattern among flow and escapement that might be suggestive of potential flow-related physical impediments to upstream passage of adult salmonids.
- Most steelhead spawning and early rearing occurs at the upstream end of the low flow channel near the Feather River Hatchery, suggesting that upstream passage is not limiting for steelhead.
- Under low flow condition, Shanghai Beach and Sunset pumps may be impassable for sturgeon due to water velocities in some areas and vertical height barrier. Steep Riffle likely passable for sturgeon without complication.
- Sturgeon spawning in Feather River Feather River from March to May. Present in Feather River in January, February, and March.

Data Available:

- Interim Report issued 1/22/03 on potential sturgeon passage impediments (SP-3.2 Task 3a). This report details sturgeon life history, physical performance parameters for sturgeon, and physical barrier characteristics in the lower Feather River (e.g., Shanghai Beach, Sunset Pumps, and Steep Riffle)
- Interim Report issued 1/22/03 on distribution and habitat use of steelhead and other fishes in the lower Feather River, 1999-2001 (SP-F10 Task 3a) This report sought to identify factors potentially limiting steelhead success in the lower Feather River and describe the characteristics of natural-origin steelhead in the reach. Multi-scale snorkeling and seining surveys were used to collect data.
- Interim Report issued 1/22/03 on evaluation of flow-related physical impediments in the Feather River below the Fish Barrier Dam (SP-F10 Task 1c). Evaluation of impediments for chinook salmon based on comparison of total chinook salmon escapement to flow data water year type.

- Interim Report issued 1/22/03 on literature review of life history and habitat requirements for Feather River fish species (SP-3.2 Task 2 and SP-F21 Task 2). A matrix of life history and habitat requirements for Feather River fish species is provided (only chinook and steelhead in interim report thus far)
- Draft report issued 1/22/03 on fish distributions in the Feather River below the Thermalito Diversion Dam to the confluence with the Sacramento River. The geographic distribution, relative abundance, seasonal distribution, and fish depictions were included for key species found in the Feather River.

Data Forthcoming:

- Final report for passage impediments expected in Summer 2003 SP-3.2 (Task 3a)
- Final Report for SP-F10 Task 1c scheduled for January 2004
- Final Report for SP-F10 Task 3a scheduled for December 2003
- SP-F10 will provide data on salmonids and their habitat in the low flow reach
- Final Report for SP-3.2 (Task 2) scheduled for December 2003 will provide data on distribution and biology of non-salmonid fishes
- SP-21 will provide information on predator/prey relationships and potential habitat considerations.

Potential PM&E Measures:

- Engineer increased flows to lower velocity passage areas at Shanghai Beach. Create attraction flow and low velocity passage area at Sunset Pumps to enhance passage.
- Conduct tracking studies to determine timing and movement patterns of sturgeon in Feather River (i.e., field-verify whether passage is indeed limiting)
- Assist in field calibration of sturgeon passage information Feather River from University California-Davis studies (conducted in lab in 2003)
- Provide increased, pulse flows to reduce holding time below passage impediments
- Installation of a passage structure to aid sturgeon passage during low-flow conditions

Technical Contacts:
Paul Bratovich
David Olsen
Wayne Dyok
Terry Mills
Mike Perrone
MaryLou Keefe

Relevant Study Plans:
SP-F3.2
SP-F10
SP-F21
SP-G2

Potential Impact: Would the Project have an adverse effect on TES salmonids through habitat modifications, specifically by altering sedime nt transport processes or by reducing gravel recruitment in the Feather River reach from Fish Barrier Dam to Afterbay Outfall? (SD1, Appendix B FE 12, FE39, FE57, FE59, FE60)

Resource Goals:

1. Minimize and mitigate project impacts that harm aquatic habitats by altering geomorphic processes or degrading water quality
2. Enhance aquatic habitats through alteration of geomorphic processes
3. Minimize and mitigate adverse project impacts on habitat, genetic integrity and population size of anadromous fishes

Key Results/Information:

- No key results have been obtained to date in Feather River from modeling efforts or field surveys
- Some substrate areas in low-flow reach have armoring and winnowing of fines from lack of gravel recruitment

Data Available:

- Habitat cross-sections for PHABSIM analysis completed (SP-G2)

Data Forthcoming:

- Mapping of spawning gravel deposits (SP-G2) and model
- Sediment transport sampling (SP-G2)
- Bank erosion analysis (SP-G2)
- SP-F9 will provide data on Feather River Hatchery returns spawning in Feather River
- SP-F10 will provide data on salmonid spawning habitat availability below Fish Barrier Dam
- SP-F16 will provide data on available instream flows and spawning suitability for anadromous fish species

Potential PM&E Measures: (assuming gravel quantity and quality is considered a limiting factor)

- Supplement existing armored gravel in low-flow reach with suitable spawning gravel to increase productivity (i.e., # fish produced per unit area). This option likely would require continued gravel supplementation over time.
- Increase flows in Feather River reach to increase available spawning habitat
- Create levy setbacks to increase meandering nature of river and improve gravel composition in critical spawning reaches of the low-flow reach
- Dredge low-flow channel to improve spawning gravel composition

Technical Contacts:

Tom Payne	Terry Mills
Mike Perrone	Wayne Dyok
Randy Brown	Jim Sherar
MaryLou Keefe	

Relevant Study Plans:

SP-G2	SP-F16
SP-F9	
SP-F10	

Potential Impact: Would the project have a substantial adverse effect through habitat modification on TES or any other fish species in Feather River reach from Fish Barrier Dam to Afterbay Outfall? (SD1, Appendix B WE37, FE12, FE57, FE58, FE59, FE60, FE111)

Resource Goals:

1. Minimize and mitigate adverse project impacts on habitat, genetic integrity, and population size of anadromous fishes.
2. Minimize or mitigate adverse project-related effects on the habitat of resident fish
3. Enhance habitat for resident aquatic species
4. Provide for upstream passage of anadromous fish

Key Results/Information:

- No key results have been obtained to date Feather River from modeling efforts or field surveys SP-F10
- Steelhead rearing and spawning occurs primarily in upper end of reach SP-F10 (Task 3A)
- Juvenile steelhead disperse downstream in reach and grow faster and generally larger in margin habitats in lower reach (SP-F10 Task 3A)
- Water temperatures and flow conditions suitable for steelhead, absence or rarity of side channels and tributaries in reach may be limiting factor in low production of steelhead juveniles (SP-F10 Task 3A)
- Water temperatures and geomorphology of the low-flow reach affected by Oroville facilities operations
- No device or method expected to provide more accurate, precise, or consistent estimation of number of juvenile steelhead in Feather River reach than currently utilized rotary screw traps SP-F10 (Task 4A)
- Current rotary screw trap efficiencies in Feather River higher than in other river systems, but available data insufficient to develop population estimates SP-F10 (Task 4A)
- Physical modifications of enhancements to current rotary screw traps may provide small benefit but largely experimental SP-F10 (Task 4A)
- Rotary screw traps immediately upstream Thermalito Afterbay Outfall (RM 59.8) successful SP-F10 (Task 4A)
- Snorkel and seining surveys indicate most young-of-year steelhead found in river reach compared to below Afterbay outfall SP-F10 (Task 4A)

Data Available:

- Habitat cross-sections for PHABSIM analysis completed SP-G2
- Description of life history and habitat requirements of non-salmonid fish species in the Feather River completed SP-F3.2 (Task 2) and SP-F21 (Task 1)

Data Forthcoming:

- Habitat analysis completed Summer 2003, will be linked with habitat suitability information SP-G2
- Field data collection and specific analyses for splittail, GIS habitat overlays expected Spring 2003 SP-F3.2 (Task 3B)
- Results from numerous tasks in SP-F10 "Evaluation of project effects on salmonids and their habitat in the Feather River below the Fish Barrier Dam" expected May-June 2003.
- SP-F16 will provide data on available instream flows and habitat suitability for anadromous fish species

- SP-21 will provide information on predator/prey relationships and potential habitat considerations.

Potential PM&E Measures:

- Add woody debris to stream reach to increase habitat complexity during rearing
- Decrease water temperatures in low-flow reach during months when spring chinook are holding
- Create deep pools in low-flow reach of Feather River to provide holding habitat for spring chinook salmon
- Increase quantity of shallow water rearing habitat Feather River from higher flows or water management actions in suitable areas
- Increase in regulated flows over baseline condition for the purpose of covering habitats with existing riparian vegetation
- Increase rearing habitat in side channels via habitat enhancement
- Enhance riparian vegetation and trees along banks for shading and increased habitat complexity. One location for vegetation enhancement could be trailer park riffle along east side, although drawback is that high-water events may require continued maintenance/improvement of this area.

Technical Contacts:

Tom Payne	Troy Baker
Mike Perrone	Wayne Dyok
David Olsen	Terry Mills
Paul Bratovich	MaryLou Keefe
Phil Unger	Randy Brown
Jim Sherar	

Relevant Study Plans:
SP-G2
SP-F3.2
SP-F10
SP-F16
SP-F21

Potential Impact: Would the project have a substantial adverse effect on TES species as related to hatchery operations and disease concerns in Lake Oroville and the Feather River from the Fish Barrier Dam to Afterbay Outfall? (SD1, Appendix B FE5, FE57, FE58, FE59)

Resource Goals:

1. Minimize or eliminate adverse project related effects on fish diseases within project waters and project affected waters
2. Initiate efforts to minimize or eliminate adverse project related effects on IHN within project waters, and project affected waters prior to license application submittal
3. Healthy freshwater and ocean fishery

Key Results/Information:

- Wild fish serve as a natural reservoir for pathogens
- No evidence to suggest wild disease outbreaks or disease-related wild fish kills occurred in reach.
- Feather River Hatchery disease outbreaks associated with multiple factors, including water temperature, pathogen presence in waters, and stocking susceptible salmonids above Oroville Dam and the hatchery intake.
- Natural occurrence of pathogens in Feather River. Minor risk of disease amplification associated with Project if temperature and/or water quality degrades in Feather River.
- IHN and *C. shasta* most important diseases that require management action in project waters
- Studies show that Nimbus strain of IHN not transmitted from hatchery to wild fish
- Although pathogens have been detected in wild, no evidence of disease outbreaks in Feather River.

Data Available:

- Interim report (SP-F2) submitted November 2002 on the evaluation of Project effects on fish disease

Data Forthcoming:

- Final disease report released as information Feather River from other reports is finalized.
- SP-F9 will provide data on Feather River Hatchery operations, cohort analysis, densities in wild, and results of study on virulence of Feather River Type II-strain IHN.
- SP-W1 will provide information on water temperature, toxicity, pesticides, bacteria, and inorganic chemistry of water for 8 sites in low-flow reach. These sites are labeled Site 21-28 in SP-W1. Final report due in 2004.
- SP-W6 will provide data on water temperature

Potential PM&E Measures:

- Evaluate all proposed actions for relevance to fish disease concerns

Technical Contacts:
MaryLou Keefe
Randy Brown

Relevant Study Plans:
SP-F2 SP-W6
SP-F9
SP-W1

Potential Impact: Would the Project have a substantial adverse effect on special status fishes by altering conditions (flow and water temperature) to favor warm water predatory fishes? (SD1, Appendix B FE58, FE111)

Resource Goals:

1. Minimize adverse project impacts that increase predation pressure on salmonids and other species beyond natural or expected rates
2. Provide for upstream passage of anadromous fish

Key Results/Information:

- River lamprey, centrarchids found infrequently in reach, juvenile rearing year-round
- Striped bass, American shad adults found up to steep riffle, primarily during spawning (Striped bass May-June; American shad (May-mid-December)
- Sacramento Pikeminnow, Sacramento Sucker, Tule Perch, and hardhead observed year-round (these are resident species) Tule perch considered infrequent and Sacramento pikeminnow, Sacramento sucker, and hardhead considered frequent
- Juvenile and adult chinook salmon and steelhead present in river reach
- High seasonal and annual variations in fish distributions

Data Available:

- Interim Report Issued 1/22/03 on distribution and habitat use of steelhead and other fishes in the lower Feather River, 1999-2001 (SP-F10 Task 3a)
- Interim Report Issued 1/22/03 on literature review of life history and habitat requirements for Feather River fish species (SP-3.2 Task 2 and SP-F21 Task 2)

Data Forthcoming:

- General literature review to identify potential predators of Feather River anadromous salmonids, describe main characteristics of their lifestyle, and identify life history of predators. A final report will be completed by December 2003. (SP-F21, Task 2)
- Produce estimates of losses to predation based on other experiments or model. A final report will be completed by December 2003. (SP-F21, Task 3)
- A review of historical and newly acquired information on the abundance and distribution of juvenile Chinook salmon and steelhead, and of resident fish that may constitute potential predators. A final report will be completed by December 2003. (SP-F21, Task 4)
- A review of past and present habitat information related to predators, including cartographic information (aerial photos and topo maps), and data Feather River from water temperature and flow monitoring surveys. Other results Feather River from other study plans will also be incorporated into this study. A final report will be completed by December 2003. Interim Report DELAYED as of 2/3/03. (SP-F21, Task 5)
- SP-F10 will provide data on salmonids and their habitat in the low flow reach
- SP-F16 will provide data on available instream flows and habitat suitability for anadromous fish species
- SP-3.2 will provide data on the distribution and biology of non-salmonid fishes

Potential PM&E Measures:

- None suggested at this time

Technical Contacts:

Mike Perrone	MaryLou Keefe	Tom Payne
Paul Bratovich	Wayne Dyok	
David Olsen	Terry Mills	

Relevant Study Plans:
SP-3.2
SP-F10
SP-F16
SP-F21

Potential Impact: Could the Project interfere substantially with fish movement such that the nutrient balance in Feather River Reach from the Fish Barrier Dam to the Afterbay Outfall is altered? (SD1, Appendix B FE29, FE11, FE 57, FE58, FE59)

Resource Goals:

1. Minimize and mitigate project related impacts on nutrient transport to tributaries of project waters
2. Provide for upstream passage of anadromous fish

Key Results/Information:

- No confirmed results yet available for this reach; focus of SP-F8 on tributaries upstream of Lake Oroville, but historical run information is useful for understanding nutrient balance in Feather River low flow reach.

Pre-Dam Escapement Estimates

- During four years of counting preceding dam construction (1963-1966), an average of 1,362 spring run chinook salmon returned per year in Feather River (range: 296-3,362 fish). Steelhead also were counted at the interim fish counting facility. An average of 582 steelhead (range: 416-914) returned annually to the Feather River during four years of counting at the facility (Painter 1977). The fish counting facility was placed in what now is the low flow portion of the Feather River.
- Fry (1961) reported that 10,000-86,000 fall run chinook salmon spawned in the Feather River during 1940-1959. Approximately 1,000-4,000 spring run chinook salmon spawned in the Feather River during the same time period. Fry did not indicate the spatial distribution of spawning in the Feather River.
- Menchen (1966) reported that an average of 1,700 spring run chinook salmon spawned in the Feather River from 1953 to 1962, with annual spawning estimates ranging from 0-4,000 fish. Menchen did not indicate the spatial distribution of spawning in the Feather River.

Post-Dam Escapement Estimates

- Feather River Fish Hatchery escapement estimates have ranged from a low of 1,856 (1967) to a high of 17,554 (1998), averaging approximately 8,000 fall chinook salmon per year (DWR 2001).
- Similar counts for spring run chinook salmon have ranged from a low of 146 fish to a high of 8.430 fish, with an average of 2,073 fish/year (DWR 1999).
- Similar counts for steelhead between 1969 and 1998 ranged from a low of 78 (1971) to a high of 2,587 (1988), with an average of 904 adults/year (DWR 1999).

Data Available:

- Historical abundance data for steelhead, spring run chinook salmon, and fall run chinook salmon in Feather River (note that abundance is not reported for just low flow reach)
- No information is available at this time for nutrient concentrations in low flow reach.

Data Forthcoming:

- Nutrient concentrations Feather River from water quality sampling available for Summer 2002.
- Literature review of nutrient balance for upstream tributaries can be applied to Feather River reach if needed. Interim report issued in February 2003.
- SP-F10 will provide data on flows and upstream migration of anadromous salmonids in low flow reach

- SP-F16 will provide data on available instream flows and habitat suitability for anadromous fish species
- SP-F9 will provide data on Feather River Hatchery juvenile predation and adult returns
- SP-F8 will provide information on energy and nutrient transfer associated with anadromous fish migrating with particular emphasis on areas in the Feather River upstream of Lake Oroville

Potential PM&E Measures:

- None suggested at this time

Technical Contacts:
Phil Unger
Troy Baker
MaryLou Keefe

Relevant Study Plans:
SP-F8
SP-F9
SP-F10
SP-F16
SP-W1

II. Terrestrial Biological Resources

Potential Impact: Does the Project have the potential to degrade the quality of wildlife habitat by altering the establishment or disbursement of noxious terrestrial and aquatic plant species in Feather River reach between Fish Barrier Dam and Afterbay Outfall? (SD1, Appendix B TE11, TE17, TE18, TE23, TE31)

Resource Goals:

1. Minimize and mitigate project-related effects on the dispersal of noxious weeds
2. Incorporate project lands in county-wide mapping process of noxious weeds
3. Control noxious weeds of greatest ecological and agricultural concern
4. Remove undesirable non-native plant species around lake, river, forebay, and afterbay areas, especially star thisle, ailanthus, and other invasive plant species
5. Restore disturbed sites with native plant communities
6. Minimize and mitigate project-related effects on dispersal of noxious aquatic weeds into downstream irrigation canals.

Key Results/Information

- Tree of heaven and scarlet wysteria present in Feather River reach

Data Available:

- No final results are available at this time

Data Forthcoming:

- SP-T3/T5 will provide data on wetland, riparian, and floodplain habitat conditions and will evaluate project-related impacts to wetland communities, hydrologic criteria, and habitats.
- SP-T4 will provide habitat mapping data, wildlife/habitat relationships, will identify high value and vulnerable habitats, as well as evaluate Project effects.
- SP-T6 will generate a wildlife management plan for lands within the Project area.
- SP-T7 will provide maps of current distribution of noxious species
- SP-T10 will identify and evaluate Project effects on upland plant communities, including appropriate opportunities for revegetation and/or restoration.

Potential PM&E Measures:

- Eliminate noxious plants via mechanical control (may require continued maintenance due to periodic high-flow events)

Technical Contacts:
Jim Sherar

Relevant Study Plans
SP-T3/5
SP-T4
SP-T6
SP-T7
SP-T10

Potential Impact: Would the Project have a substantial adverse effect, either directly or through habitat modification, on any terrestrial or vegetative TES species in Feather River reach between Fish Barrier Dam to Afterbay Outfall? (SD1, Appendix B TE11, TE16, TE17, TE18, TE25)

Resource Goals:

1. Minimize and mitigate adverse project effects on special status plant and animal species
2. Promote the expansion of sensitive species

Key Results/Information:

- Presence of Western Yellow-billed Cuckoo and Valley Elderberry Longhorn Beetle
- Potential to affect special status wildlife, although species yet to be determined

Data Available:

- No final results are available at this time

Data Forthcoming:

- SP-T1 will identify Project-related effects on wildlife habitat including habitat loss or fragmentation
- SP-T2 will identify non-fish TES species and potential Project impacts
- SP-T3/T5 will provide data on wetland, riparian, and floodplain habitat conditions and will evaluate project-related impacts to wetland communities, hydrologic criteria, and habitats.
- SP-T7 will provide maps of current distribution of noxious species
- SP-T9 will provide information on recreation/wildlife conflicts and loss of habitat due to recreational activities and facilities.
- Final results not expected until late 2003 and early 2004

Potential PM&E Measures:

- Enhance or add riparian habitat for TES species (may require continued maintenance due to periodic high-flow events)

Technical Contacts:
Jim Sherar

Relevant Study Plans:
SP-T1
SP-T2
SP-T3/T5
SP-T7
SP-T9

Potential Impact: Would the Project interfere substantially with the movement of any wildlife species, or with established native resident or migratory wildlife corridors in Feather River reach between Fish Barrier Dam and Afterbay Outfall? (SD1, Appendix B TE62)

Resource Goals:

1. Minimize and mitigate project related recreation impacts on wildlife and plant communities
2. Enhance nesting and wintering Pacific Flyway waterfowl and plant communities

Key Results/Information

- Likely minor impacts movement of wildlife due to recreation

Data Available:

- No final results available at this time

Data Forthcoming:

- SP-T1 will identify Project-related effects on wildlife habitat including habitat loss or fragmentation
- SP-T2 will identify non-fish TES species and potential Project impacts
- SP-T7 will provide maps of current distribution of noxious species
- SP-T9 will provide information on recreation/wildlife conflicts and loss of habitat due to recreational activities and facilities.
- Results not expected until late 2003 and early 2004

Potential PM&E Measures:

- Modify recreational use patterns in Feather River reach to minimize impacts to important terrestrial species (exact measures dependent on analysis in upcoming report)

Technical Contacts:
Jim Sherar

Relevant Study Plans:
SP-T1
SP-T2
SP-T7
SP-T9

III. Hydrology and Water Quality

Potential Impact: Would the Project have substantial adverse effects on water temperatures in Feather River reach from Fish Barrier Dam to Afterbay Outfall that might impact special status fish species, agriculture, or violate state standards? (SD1, Appendix B WE26, FE57, FE59, FE60, TE61)

Resource Goals:

1. Minimize and mitigate adverse project effects on water temperatures needed to protect beneficial uses
2. Maintain suitable water temperatures in waters affected by the project to protect beneficial uses

Key Results/Information:

- Water temperatures too low for rice farmers during some periods during year; rice farmers have guaranteed water right
- Increasing water temperatures in low flow reach to benefit agriculture likely has negative impacts to fisheries resources and potentially water quality in the reach.
- Diverting water for agriculture better addressed in Thermalito Complex portion of data review and as water temperature data and hatchery studies become available in March 2003

Data Available:

- Quarterly progress reports associated with SP-W1
- Water temperature plots for 4 sites in Feather river between Fish Barrier Dam to Afterbay Outfall (plots may change based on data availability)

Data Forthcoming:

- Interim water quality report scheduled for release in April 2003. This report will contain information on water temperature, toxicity, pesticides, bacteria, and inorganic chemistry of water for 8 sites in low-flow reach. These sites are labeled Site 21-28 in SP-W1. Final report due in 2004.
- SP-F9 focuses on impacts of hatchery operations on naturally-spawning salmon and includes several tasks, such as describing the Feather River Hatchery facilities and operations and estimating the Feather River Hatchery contribution to in-river and hatchery spawning salmonid populations. Task reports are scheduled for completion in Spring 2003.
- Salmonid tag recovery efforts on the Feather River and Mill, Deer, Butte Creeks are scheduled for completion in Spring 2003 (SP-F9) and will provide information on the Feather River Hatchery contribution to fisheries.
- Final report of hatchery study is due by early-summer 2004 (SP-F9).

Potential PM&E Measures:

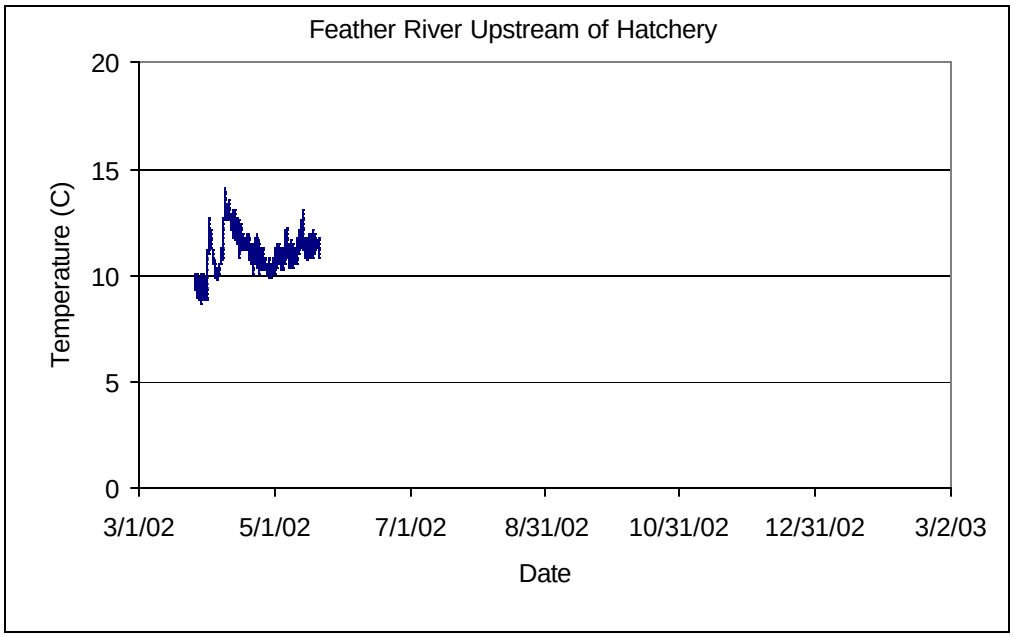
- Divert water from upper portion of Thermalito Complex into a canal or off-channel basin so that water can warm prior to agricultural use and will reduce impacts to coldwater fisheries.

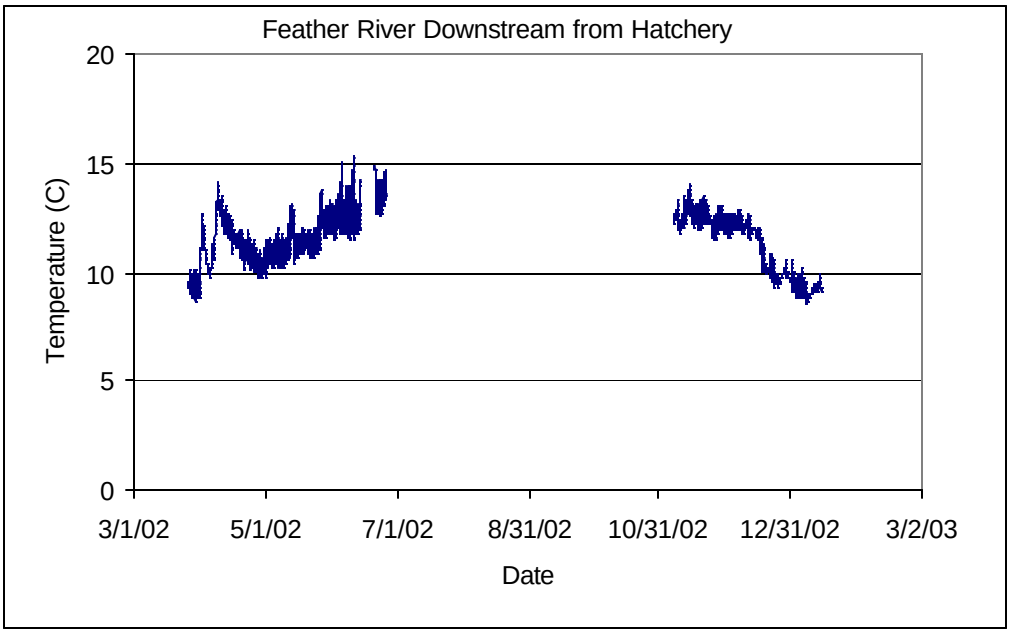
Technical Contacts:
Jerry Boles
Erich Brandstetter
Tom Payne
Wayne Dyok
Randy Brown

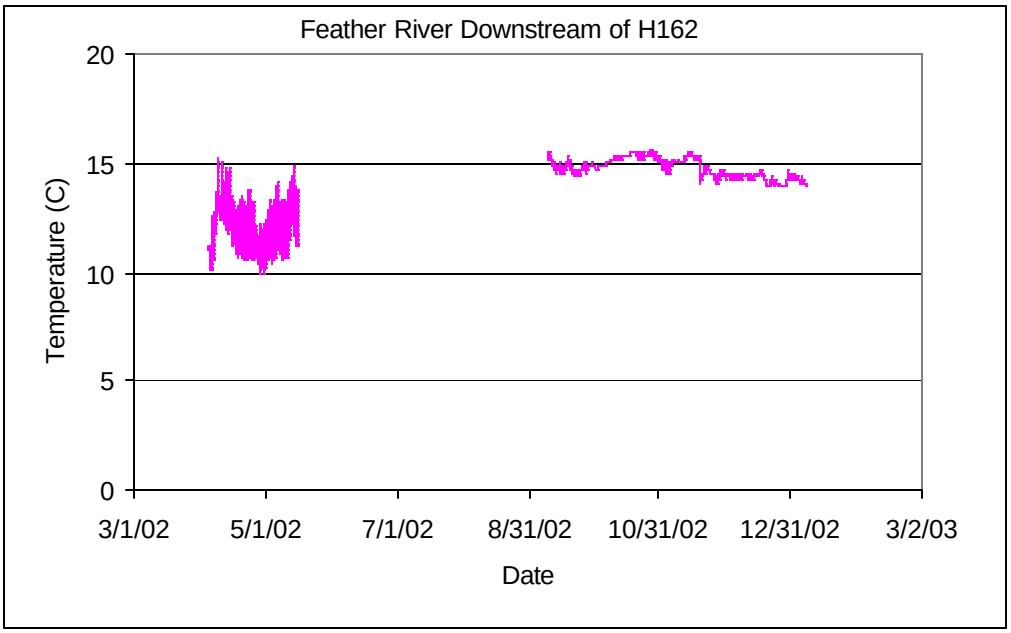
Relevant Study Plans:
SP-W1
SP-G2
SP-F9
SP-F10
SP-F16

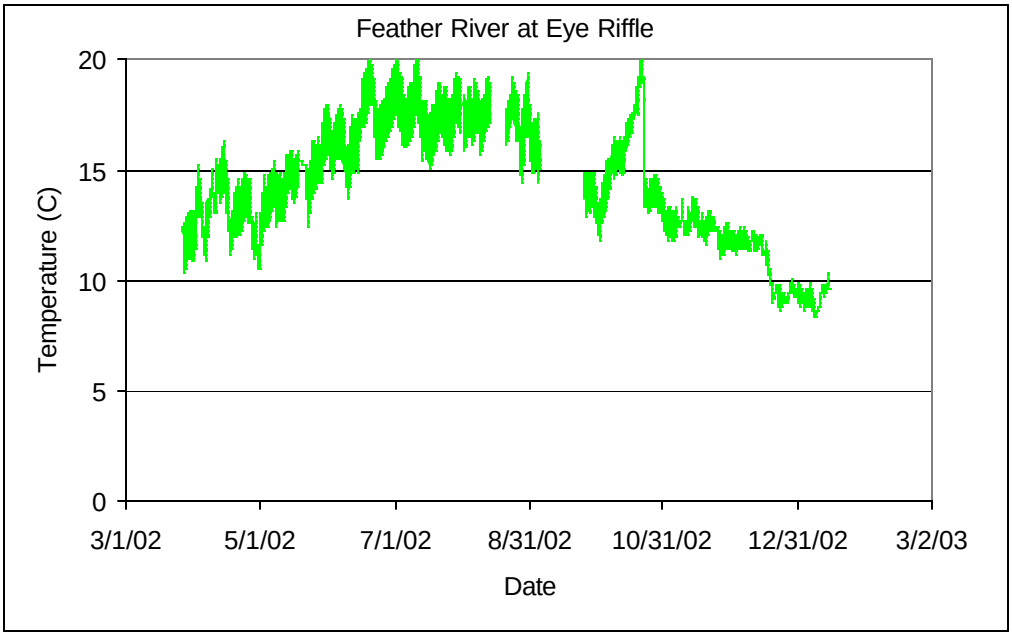
Temperature: Feather River in Project Boundary for sites between Fish Barrier Dam and Afterbay Outfall

Provided by Dr. Erich Brandstetter, February 14, 2003 (subject to change based on data availability)






Feather River Downstream of H162
Temperature (C)
20
15
10
5
0
3/1/02
5/1/02
7/1/02
8/31/02
10/31/02
12/31/02
3/2/03
Date


Feather River at Eye Riffle
Temperature (C)
20
15
10
5
0
3/1/02
5/1/02
7/1/02
8/31/02
10/31/02
12/31/02
3/2/03
Date

Potential Impact: Would the Project have adverse effects on water quality that subsequently impacts fisheries resources from Feather River Hatchery holding ponds? (SD1, Appendix B FE12, FE29, FE57, FE58, FE71)

Key Results/Information:

- Survival/growth studies indicate "transient" hits during toxicity screening for fish near Fish Hatchery
- Hatchery holding ponds supposed to hold water for evaporation, but water leaches through cobble pile

Data Available:

- Quarterly progress reports associated with SP-W1

Data Forthcoming:

- SP-F9 focuses on impacts of hatchery operations on naturally-spawning salmon and includes several tasks, such as describing the Feather River Hatchery facilities and operations and estimating the Feather River Hatchery contribution to in-river and hatchery spawning salmonid populations. These data are expected to provide further information on the point-source inputs. Task reports are scheduled for completion in Spring 2003.
- Final report of hatchery study is due by early-summer 2004 (SP-F9).
- Interim water quality report scheduled for release in April 2003. This report will contain information on water temperature, toxicity, pesticides, bacteria, and inorganic chemistry of water for 8 sites in low-flow reach. These sites are labeled Site 21-28 in SP-W1. Final report due in 2004.

Potential PM&E Measures:

- Relocate site for hatchery holding ponds or construct new, functional ponds
- Line existing holding pond with impermeable barrier to prevent leaching
- Assuming further toxic screening indicates problems, post "no swim" or "don't eat fish" warnings anywhere that tissue and/or sediment results suggest problems may be present.

Technical Contacts:
Phil Unger
Jerry Boles
Randy Brown

Relevant Study Plans:
SP-F8
SP-F9
SP-F10
SP-W1